b. substituting the depolymerized food gum for 0.5 to 100% of at least one nutritive component of the edible product,

wherein the depolymerized food gum provides the physical, organoleptic and non-sweetening, functional benefits of the nutritive component for which the depolymerized food gum was substituted.

REMARKS

Applicants' claims have been amended to clarify that the elements of the claims that were previously set forth as preamble limitations or character limitations in the claims, are in fact essential elements of Applicants' invention.

Rejection under Section 102(e) over Tomita

Applicants' claims do not read on the disclosure of Tomita. Applicants are not claiming hydrolyzed konjac gum having an average molecular weight of 2,000 to 15,000. Instead, Applicants are claiming foods containing a sugar-replacer or a bulking agent having the particular limitations set forth in Applicants' claims and in Applicants' response of May 30, 1991, that was filed in response to the Examiner's previous Office Action. Tomita neither discloses, nor suggests that a hydrolyzed konjac gum is useful as a functional replacement (non-sweetening) for sugar in foods, nor that the functional utility which was identified by Applicants is limited to hydrolysates having a DP of 3 to 75, and preferably a DP of 3 to 30.

In addition, submitted herewith is a 37 C.F.R. Section 1.131 Affidavit, antedating the filing date of the Tomita reference and removing it as a reference herein.

Section 102(a) Rejection over Schnepp

Applicants' comments from their May 30, 1991, response to the Examiner's first Office Action are repeated herein. In summary, Applicants are not claiming the depolymerized heteropolysaccharides, per se. Each word in Applicants' claims is critical to the definition of the scope of Applicants' claims. Applicants are claiming new uses for the depolymerized heteropolysaccharides, not claiming the depolymerized heteropolysaccharides themselves. The fact that Schnepp never considered the use of enzymatically degraded heteropolysaccharides as functional replacements for sugars and other nutritive components in foods is shown in the statement on page 4 of the Schnepp publication that "The viscosity of the inventively produced heteropolysaccharides in 5% by weight aqueous solutions is between 15 and 1,000 mPAS, measured at 80°C on a Brookfield Viscometer, Model RVT at 20 r.p.m. and spindle 1." The unit of viscosity, mPAS, is approximately equivalent (1 mPAS · sec = 1 cps) to the cps viscosity unit used by Applicants. As set forth on page 15, lines 19-23, of Applicants' specification, the depolymerized heteropolysaccharides of Applicant's invention must have a viscosity of no greater than 50 cps in a 30% solution for use as a functional replacement for sugar in foods. As shown on page 25, lines 15-32, of Applicants' specification,

a guar gum hydrolysate having a viscosity in a 30% solution as low as 2,500 cps produced unacceptable organoleptic quality when used to replace sucrose in yellow cake. Furthermore, reading the Schnepp reference as a whole, it is clear that it was directed to the use of particular degraded heteropolysaccharides as sizes during the manufacture of fabric. Applicants' depolymerized heteropolysaccharides (having a DP of 3 to 75) are not suitable (lack of sufficient viscosity) for use as a textile size. Thus, notwithstanding the entire disclosure contained within the Schnepp reference, Applicants' claimed invention is new.

In addition, submitted herewith is a 37 CFR Section 1.131 Affidavit, antedating the publication date of the Schnepp reference and removing it as a reference herein.

Rejection Under Section 102(a) over Keramaris

Once again, Applicants urge that their invention is not "thickening agents", nor partially depolymerized derivatives of the endosperm of mesquite beans. While the Keramaris reference has not been translated into English in its entirety, the Abstract alone indicates that the invention is directed to thickeners having relatively high viscosities "(e.g. 3,000 mPA. sec at 1%)". Furthermore, the term "bulking agent" has a meaning to one skilled in the art of food science which is entirely different from the meaning of the term "thickening agent".

Rejection Under Section 103 over Keramaris

As stated above, the disclosure of Keramaris that a partially depolymerized derivative of a mesquite bean polysaccharide may be used as a thickener in foodstuffs suggests nothing about the performance of a depolymerized food gum having a DP of 3 to 75 and a maximum viscosity of 50 cps in a 30% solution, nor about the beneficial effects of using such a product as a bulking agent to replace sucrose and other sugars in foods. Any doubt about the transferability of technology between thickeners and bulking agents may be dispelled by reviewing Applicants' experimental data set forth on pages 23-28 of Applicants' specification. The data consistently show that high viscosity bulking agents produce low quality foods.

Rejection Under Section 103 over Hill, Barnett and Dartey

Applicants note the Examiner's reference to column 9 of Hill, wherein Hill discloses "non-ionic or neutral plant hydrocolloids such as guar and locust bean gum, after at least partial depolymerization and/or hydrolysis, are of value in casting edible films and as ingredients in and basis for a variety of food products, in the manufacture of paper, for sizing, printing and finishing of textiles, and for other purposes, especially because of their resistance to putrefaction." Thus, Hill generally discloses that guar gum can be thinned and used in foods. This conclusion does not suggest Applicants' invention. As indicated above, Applicants' experimental data show that the claimed DP of 3 to 75, (preferably 3 to 30) and the maximum suitable viscosity for food use (50 cps in a 30% solution) are critical elements of Applicants' invention. Not only are

these elements not suggested by the Hill reference, but the Hill reference teaches that a relatively high viscosity (e.g., 12,550 cps for a 10% solution) is suitable for the applications suggested in column 9. See columns 11 and 12, Examples 1 and 2, of the Hill reference.

Furthermore, the thinned guar gum disclosed by Hill is thinned using sulfonic acids with surfactant properties (e.g., dodecylbenzene sulfonic acid) (see column 2, lines 12-64) and is, therefore, not edible.

With respect to the Barnett reference, the combination of Hill and Barnett still does not suggest Applicants' invention. Barnett teaches that "A hemicellulose A, a hemicellulose B, a modified hemicellulose A, and a modified hemicellulose B, or mixtures thereof" will provide functional properties of fats or carbohydrates in a food product when used as a replacement for all or a portion of the fat or carbohydrate. See Claim 1 of Barnett. Barnett defines the hemicelluloses as polymers of various carbohydrates which are the structural components of plant materials. The modified hemicelluloses are defined as the 4 to 10 DP breakdown products of the hemicelluloses following treatment with enzymes or acid. Barnett does not disclose whether there are viscosity or DP limitations which hinder the use of the hemicellulose A and B fractions as bulking agents. However, it is well known in the art that hemicellulose is a polymer of about 150-200 units of xylose, a pentose monosaccharide. See, Principles of Food Science, Owen R. Fennema, Editor, Marcel Dekker, Inc., New York, 1976, pages 679-680. Thus, Barnett teaches that the molecular size of the bulking agent is not a critical limitation in the use of the bulking agent in foods (i.e., a hemicellulose having DP of 4-10 or a DP of 150-200 are taught to be useful equivalents).

With respect to the Dartey reference, Applicants note that the disclosure at column 15, first complete paragraph, states "The doughs of the present invention can optionally include bulking agents such as dietary fiber and hydrocolloids. ...Exemplary of hydrocolloids which can be used are xanthan gum, gelatin, guar gum, methocel, agar and humectant gels. Suitable amounts of the hydrocolloids range up to about 5% by weight, based upon the weight of the dough." Applicants have not claimed the use of "hydrocolloids" as bulking agents. Applicants' claims are limited to particular depolymerized food gums having a DP of 3 to 75. Applicants have discovered that bulking agents selected with these particular characteristics can be used in place of sucrose and other sugars at amounts up to 100% of the sugar normally present in the food. In Claims 1 and 41 of Dartey, cookie dough compositions are disclosed which contain about 5 to about 20%, by weight, of at least one sugar and 5 to 20% of at least one water soluble polydextrose. These amounts are recited in addition to about 4 to about 15% by weight of a cellulosic bulking agent. Nothing disclosed in Dartey suggests that a hydrocolloid could be used to replace all of the sugar (and all of the polydextrose which is added to the dough in Dartey as a sugar replacement, i.e., 10-40% of the dough) and still obtain a cookie dough that is functionally and organoleptically acceptable. (If the cellulosic bulking agent is included, the hydrocolloid would replace 14-55% of the dough ingredients.) Dartey teaches that a maximum of 5% hydrocolloid may be used. Applicants' bulking agents could be used at 14-55% of the dough. The teachings of Dartey, as well as the teachings of Hill and Barnett, alone and in combination, fall

short of suggesting Applicants' invention. In those Section 103 references that teach the use of a bulking agent in foods, the teaching, in fact, suggests that the critical limitations discovered by Applicants are irrelevant to the use of the bulking agents in foods (i.e., Barnett teaches that either 150-200 DP hemicelluloses or modified (degraded) 4-10 DP hemicelluloses may be used on an equivalent basis as a bulking agent in foods).

CONCLUSION

For the reasons set forth above, and in view of the Section 1.131 Affidavit and the Section 1.48(b) Petition, Applicants respectfully request that the Examiner allow all claims pending herein.

Respectfully submitted,

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BY Mary E. Porter